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CLAIMS

[Claim(s)]

[Claim 1] As opposed to the image information inputted by input means to input image information, and this input means In the image processing system which has a color recognition means to recognize the specific color contained in this, and an image processing means to perform image processing based on the specific color recognized by this color recognition means Image information is inputted twice [at least] or more with said input means. By the 1st input of them The image processing system characterized by setting up the color recognition conditions of said color recognition means, recognizing the specific color contained in input image information by the 2nd input based on said color recognition conditions based on color distribution of said input image information, and processing an image.

[Claim 2] It is the image processing system according to claim 1 characterized by performing detection of said color recognition conditions using the histogram of input color information.

[Claim 3] Said image processing processing is an image processing system according to claim 1 characterized by being the processing which changes a manuscript color into a pattern.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to an image processing system, for example, a digital process copying machine, an image scanner, FAX, etc.

[0002]

[Description of the Prior Art] By the former, for example, a digital copier, after irradiating a manuscript with a halogen lamp etc. and carrying out photo electric conversion of the reflected light using charge-coupled devices, such as CCD, it changes into a digital signal, and after performing predetermined processing, the image is formed using recording devices, such as a laser printer, a liquid crystal printer, a thermal printer, and an ink jet printer.

[0003] By the way, it is related with this digital reproducing unit, an image processing, such as transposing to a pattern which is different for every color using the information, after performing color recognition using the color recognition circuit which recognizes the specific color information on an input image from input image information, is performed, and the equipment which forms an image with a recording device is proposed.

[0004] Thus, in order to recognize a color and to process based on it, the color which should be recognized beforehand is memorized (constant) and changing based on the information is also made.

[0005]

[Problem(s) to be Solved by the Invention] However, when the color on a manuscript has been recognized based on the color information on the above immobilization set up beforehand, there is a possibility of also changing the color I do not want you to change. The situation where the color I want you to change contrary to this on the other hand is not changed etc. may arise.

[0006] Moreover, also in an actuation side, the same trouble as **** arises from the directions gap by area assignment etc. within and without the appointed field.

[0007] And when the color information memorized by immobilization was used, there was a trouble of causing an incorrect judging in a delicate place.

[0008] This invention was made in order to solve the above-mentioned trouble, and it aims at obtaining the image processing system which can carry out processing processing certainly and can output the specific color in an input image by recognizing a specific color based on color distribution of input image information.

[0009]

[Means for Solving the Problem and its Function] In order to solve the above-mentioned technical problem, the image processing system of this invention As opposed to the image information inputted by input means to input image information, and this input means It is at the image processing system which has a color recognition means to recognize the color contained in this, and an image processing means to perform image processing based on the color recognized by this color recognition means. Image information is inputted twice [at least] or more with said input means. Among those by the 1st input Based on color distribution of said input image information, the color recognition conditions of said color recognition means are set up, the color contained in input image information by the 2nd input based on said color

recognition conditions is recognized, and it is characterized by processing an image.

[0010]

[Example] (Example 1) Based on a drawing, the example of this invention is explained hereafter.

[0011] Drawing 1 is the perspective view of a reproducing unit showing one example of this invention.

[0012] The reproducing unit concerning this example is formed from the reader unit A which reads a manuscript image, and the printer unit B which forms the read image concerned on record media, such as paper, as shown in drawing 1. Moreover, the control unit A-1 later mentioned about drawing 3 is formed in the reader unit A.

[0013] As shown in drawing 2, a manuscript places the field (manuscript side) in which the image read is formed upside down on manuscript base glass 3, is laid, and is pressed on glass 3 with the manuscript covering 4. A manuscript side is illuminated by the fluorescent lamp 2, and the reflected light is read through mirrors 5 and 7 and a lens 6, and is condensed on the field of CCD1 as a sensor.

[0014] Migration control of a mirror 7 and the mirror 5 is carried out in the direction of vertical scanning with the relative velocity of 2:1.

[0015] The picture signal serially processed for every bit of CCD1 in the reader unit A is inputted into the laser scan optical-system unit 25 of the printer unit B. This unit 25 consists of a semiconductor laser unit, a collimator lens, a rotation polyhedron mirror (polygon mirror), a F-theta lens, amendment optical system, etc. That is, the picture signal from the reader unit A is irradiated by the polyhedron mirror which is supplied to a laser unit, and electric-light conversion is carried out here, and carries out high-speed rotation through a collimator lens, and the reflected light carries out incidence of it to a photo conductor 8, and it is scanned.

[0016] About the photo conductor 8, the pre-electric discharge machine 9, the pre-electric discharge lamp 10, the primary electrification machine 11, the secondary electrification machine 12, the pre-exposure lamp 13, a development counter 14, a sheet paper cassette 15, the feed roller 16, the feed guide 17, the resist roller 18, the imprint electrification machine 19, the separation roller 20, the conveyance guide 21, the fixing assembly 22, and the tray 23 grade are arranged as a process component which makes image formation possible. In addition, the rate of a photo conductor 8 and a conveyance system is made into 150 mm/sec. Moreover, although the printer unit B uses the so-called laser beam printer in this example, you may be the printer of an ink jet printer and others. The printer of the so-called Bubble Jet using the head of the type which makes a drop breathe out especially using film boiling by heat energy may be used.

[0017] The example of the control unit of the reproducing unit of drawing 1 is shown in drawing 3, and it explains to it below.

[0018] 201 is a ten key and is for inputting the numeric value to 0-9 at the time of the scale-factor input of copy number of sheets or a zoom.

[0019] 202 is a liquid crystal color display panel and a touch panel, and it is used in order to set up a machine state and copy mode and to tell an operator operating instructions, a paper size, a copy scale factor, etc.

[0020] 203 is a reset key and is a key for initializing the mode by which a current setup is carried out.

[0021] It is a clearance/stop key, 204 stops actuation, while a machine is operating, and since while a machine is not operating clears the numeric value set up with the ten key etc. in number of sheets etc., it uses it.

[0022] 205 is a copy start key, and when starting copy actuation, it is used.

[0023] 206 is a key for choosing a paper size, and the size (for example, A4) of the selected form is displayed on a display panel 302.

[0024] 207 is a concentration adjustment key, and it is used in order to adjust the concentration of a copy from a thin thing to a deep thing. 208 is a drop which displays current concentration level with nine light emitting diodes (it omits Following LED).

[0025] 209 is the selection key in manuscript class mode, and performs selection of a character mode, photograph mode, and the alphabetic character / photograph mode according to the class of manuscript.

[0026] 210 is LED, it is shown that a character mode, photograph mode, and an alphabetic character / photograph mode are chosen, respectively, and only one of three pieces lights.

[0027] It is a control key, 211 consists of the O.K. key 212, an up arrow key 213, a down arrow key 214, a right arrow key 215, and a left arrow key 216, and when moving cursor in a display panel 202 and setting up each mode, it is used.

[0028] 217 is a rotation knob and is mentioned later for details.

[0029] 219 is fixed form variable power / actual size key, and when making it the form of a fixed form from the form of a fixed form at enlarging or contracting or actual size, it is used.

[0030] 220 is a pin center, large navigation key, and when sending and copying a manuscript in the center of a copy paper, it is used. When pin center, large migration is set up, LED of 229 lights.

[0031] 221 is a zoom key, and when setting a scale factor as a unit 1% from 25% to 400%, it is used.

[0032] It is length / horizontal independent zoom key, 222 is used, when changing the scale factor of the lengthwise direction and longitudinal direction of a manuscript and taking a copy, and when setting a scale factor as a unit 1% from 25% to 400%, respectively, it is used.

[0033] 223 is an auto zoom key, and when copying automatically according to the magnitude of a manuscript, it is used.

[0034] 224 is a binding margin key, moves the image of a manuscript to right and left, and makes and copies a binding margin.

[0035] 225 is an area assignment key, and using block-definition means, such as an editor, when performing area assignment, it is used.

[0036] 226 is used when adjusting delicate balance by the fill turkey.

[0037] 227 is a partial processing key, and when opting for the processing in area or opting for the processing within a marker, it is specified.

[0038] 228 is a color pattern processing key, and it is used in order to set up the mode in which color recognition processing of this example is performed.

[0039] Next, the block diagram showing control of the whole reproducing unit of drawing 1 - drawing 3 in drawing 4 is shown.

[0040] In drawing 4, image formation of the reflected light from a manuscript 1000 is carried out to image sensors 302 with the lens 301 of the image reading section 2000, and it is changed into the electrical signal of R, G, and B.

[0041] Next, it is sent to A/D converter 303 which performs A/D conversion, and the signal after A/D conversion is inputted into the image-processing section 3000. In the image-processing section 3000, after a shading compensation 304 is performed, it is sent to the color recognition circuit 305. Here, the color information on a manuscript is analyzed and an analysis result is outputted to the convertible color recognition circuit 309. The convertible color recognition circuit 309 is a circuit which recognizes a color convertible based on an analysis result. Next, it is sent to the image editorial department 307 through the light color concentration conversion circuit 306 from the color recognition circuit 305. And the image-processing section 3000 carries out processing termination, and it is sent to the image recording section 4000. The image recording section 4000 is constituted by control circuits, such as a motor which conveys a transfer paper etc., the laser record circuit section which writes the video signal inputted from the image-processing section 3000 in a photoconductor drum, and the development control circuit which performs development. Moreover, the CPU circuit section 5000 has CPU311, ROM313, and RAM314, and controls the sequential control of the image reading section 301, the image-processing section 302, the image recording section 303 and a control unit 312, and digital TAIZA 315 grade book equipment in the gross.

[0042] The detail configuration of this color recognition circuit 305 is shown in drawing 5.

[0043] The hue signal is used for the color recognition approach in the color recognition circuit 305 in this example. This is the same hue, and when the vividness and brightness differ from each other, it is because an exact judgment can be performed (although it differs from the hue usually expressed correctly, the following explanation explains as a "hue").

[0044] The outline of the color recognition approach is explained first.

[0045] Each data of R, G, and B inputted is 8-bit data each, and has the information on a total of 224 colors. For this reason, it will become expensive from the scale of that circuit to use such huge information as it is. So, in this example, color recognition processing as shown in drawing 5 is performed in consideration of the following points.

[0046] R and G which are inputted, and B data are first inputted into the max/mid/min detecting element 401 which performs the size distinction. By comparing each input data using a comparator, this calculates a max value (maximum), mid (mean value), and a min value (minimum value), and outputs each value. Moreover, each output value of a comparator is outputted to coincidence as a ranking signal.

[0047] What is expressed with saturation, lightness, and a hue is known as the color space is known for the color solid of Munsell etc. And it is necessary to change each data of R, G, and B into a flat surface, i.e., two-dimensional data, first. In this example, min (R, G, B) which is the common section of R, G, and B, i.e., the minimum value of R, G, and B, is made to subtract min (R, G, B) from each R, G, and B data, and to use the information which remained as a chromatic color component using an achromatic color part being shown. Thereby, the amount of data can be reduced and the input color space of a three dimension can be changed into a two-dimensional color space with an easy configuration.

[0048] Thus, even 0 degree - 360 degrees are divided into six fields, and the changed two-dimensional color space is made into each information on the sequence of the magnitude of R, G, and B into which it is inputted, i.e., $R > G > B$, $R > B > G$, $G > B > R$, $G > R > B$, $B > G > R$, and $B > R > G$, as shown in drawing 6.

[0049] Moreover, when it divides into 0 degree - 360 degrees, the number of the numbers of pixels is totaled to each, a histogram is created, and it is considering as the color information on a color copy. (Refer to drawing 7)

As shown in drawing 7, an axis of abscissa shows a hue, and an axis of ordinate shows the number of pixels. As shown in this drawing, it is defined as that color existing in a color copy that the width of face of the value 1 and wide 2 illustrated is more than constant value from the histogram which the pixel concentrated for every color gamut. (8701 color recognition processings 1 of drawing)

In this example, in order to reduce an achromatic color component with subtractors 402 and 403 from the outputted max value and a mid value for the above image processing processing, from the max value and the mid value, the min value which is the minimum value was subtracted and it has inputted into the hue detecting element 404 with the ranking signal. The hue detecting element 404 consists of possible storage elements of random access, such as RAM or ROM, and consists of look-up tables which used ROM at this example.

[0050] The value corresponding to the include angle of the flat surface beforehand shown in drawing 6 is memorized by the hue detecting element 404 which is the look-up table which consisted of this ROM, and a corresponding hue value is outputted to it by the ranking signal inputted, and a value (max-min) and a value (mid-min).

[0051] Based on the maximum of R, G, and B which are inputted as the sequence of the magnitude of R, G, and B which are inputted by this, and a mean value, with the easy configuration of using LUT (look-up table) etc., the input color space of a three dimension can be changed into a two-dimensional color space, and a corresponding hue can be searched for.

[0052] Thus, the outputted hue value is inputted into the window comparator 405,406 next. A setup of the reference-value compound value to this comparator 405,406 is performed by CPU311. This reference value is made winde1 in drawing 7, and binary (a reference value is determined by the 701 color recognition processing 1 of drawing 8).

[0053] Originally with a data input means etc., color data to change are inputted, and it sets to a comparator, after giving offset of a request of the hue data suitable for the color by CPU311.

[0054] A comparator 405 is $>$ (input hue data) (a1) to the hue data inputted, when a setting reference value sets to a1.

"1" is outputted at the time of **.

[0055] the hue data which will be similarly inputted if a setting reference value sets a comparator 406 to a2 — receiving — $<$ (input hue data) (a2) —

It is constituted so that "1" may be outputted at the time of **.

[0056] Therefore, "1" is outputted by the latter AND gate 408 from a color recognition circuit at the time of <(a1) (input hue data) <(a2)
 (702 color recognition processing 2 reference of drawing 8).

[0057] From this result, an image processing is performed by image processing of 703.

[0058] The control means about the above processing is explained.

[0059] In drawing 7 , first, key processing of mode setting, number-of-sheets assignment, etc. is performed (step 710), and it judges whether the start key was turned on (step 11). Next, image processing processing, for example, patternizing processing of a specific color, and processing of the following when it judges whether the trimming of only a specific color or the color recognition mode in which masking processing is performed is set up by the control unit 312 (step 712) and is set up are performed. When not set up, the usual processing is performed (step 716) and an image output is performed (step 717).

[0060] In color recognition mode, first, the reader unit A performs a PURISU can and the 1st image data input is performed (step 713). At this time, the convertible color recognition circuit 309 creates the histogram of the value of a hue using a counter or RAM (step 714), and recognizes a convertible color (step 701). And it judges whether a convertible color exists according to the width of face of above-mentioned wide 1 and 2, and further, in existing, it determines the reference value set as a comparator 405,406. As this decision approach, it is possible to take each median of wide 1 and 2 etc., for example. Thus, the determined reference value is set as a comparator 405,406 by CPU311. After these color recognition processings 1 are completed, next the Maine scan is performed (step 715), color recognition processing 2 for actual image formation is performed (step 702), and image processing of patternizing processing, trimming, masking processing, etc., etc. is performed to the recognized color (step 703).

[0061] In addition, it cannot be overemphasized that the color of color recognition will also turn into two or more colors at it if this is made into two or more sets although the window comparator followed 1 set of examples in the above explanation.

[0062] (Example 2) Next, how to recognize the color information on a manuscript in a higher precision is explained, without performing PURISU can actuation of multiple times and increasing a storage element.

[0063] Since it is the same as that of an example 1 about the configuration of a machine, explanation is omitted.

[0064] 2 times of PURISU cans are performed especially in this example. It explains that the actuation flows using the flow chart of drawing 9 .

[0065] In the key processing 801, when color recognition image processing processing is not chosen, an image is usually outputted by branching 803 from a printer through processing 812. This usual processing 812 is the usual image reading actuation, and since it is not the main point of the invention in this application, it omits explanation.

[0066] In the key processing 801, when color recognition image processing processing is chosen, PURISU can actuation 804 which is the 1st time is performed first. This actuation recognizes the rough color which reads the image data of a manuscript coarsely and is on a manuscript from little data. At this time, it is scanning with the scan speed 4 times the speed of usual, and the image is read by resolving of horizontal scanning and vertical scanning 1/4. Histogram creation 805 is performed from 1/16 of usual image data. A histogram expresses the occurrence frequency of a hue include angle, as shown in drawing 7 . At the 2nd following PURISU can 806, from the histogram obtained by the 1st PURISU can, in order to take a histogram with a precision sufficient [the maximum hue include angle of recognition coloration, and near the minimum hue include angle], an image is read at the usually same rate as a scan. Next, from the read data, a histogram is taken by the 2nd histogram creation 807 only about near a specific hue include angle. That is, when it explains using drawing 10 , this graph is a histogram showing the frequency to the hue include angle obtained by the 1st PURISU can first. It expresses that many colors on a manuscript of a hue with much frequency exist with this graph. In this example, the 1st, 2, and 3 color exists on a manuscript, and takes the histogram of the field of a field (1) field (2) with a more sufficient precision by the 2nd PURISU can. Since the block configuration of a

circuit is the same as that of an example 1, explanation is omitted.

[0067] As explained above, according to the example of this invention, in area assignment, point assignment, and image processing using fixed-storage color information, the incorrect judging had occurred in processing conventionally, but It is effective in the ability to perform high processing actuation of precision, without being able to perform image processing and doing complicated activities, such as the setup, by at least two input operation or more, without carrying out an incorrect judging by recognizing color copy color information.

[0068]

[Effect of the Invention] As mentioned above, based on color distribution of input image information, by recognizing a specific color, processing processing can be carried out certainly and, according to this invention, the specific color in an input image can be outputted.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The perspective view of a reproducing unit showing the example of this invention.

[Drawing 2] The sectional view of a copying machine.

[Drawing 3] The control unit Fig. of a copying machine.

[Drawing 4] The block diagram showing control of the whole actuation of a reproducing unit.

[Drawing 5] The detail block diagram of the color detecting element of this example.

[Drawing 6] The hue side Fig. for explaining color recognition.

[Drawing 7] The histogram Fig. used for detection of color recognition conditions.

[Drawing 8] The flow chart Fig. showing the image-processing actuation in the 1st example.

[Drawing 9] The flow chart Fig. showing the image-processing actuation in the 2nd example.

[Drawing 10] The histogram Fig. used for the color recognition conditions of an example 2.

[Description of Notations]

305 Color Recognition Circuit

309 Convertible Color Recognition Circuit

404 Hue Detector

701 1 Block of Color Recognition Processings

702 2 Blocks of Color Recognition Processings

703 Image Processing Processing Block

[Translation done.]